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Abstract

URANIUM PREPARED BY POWDER METALLURGY TECHNIQUES

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Uranium prepared by powder metallurgy techniques and its thermo-mechanical treatment have been investigated for many years in a number of countries.

By controlling the particle size of the initial powder the powder metallurgy method permits to influence both the grain size of the metal in uranium compacted bodies and the number and the character of the oxide inclusion distribution. The latter are introduced in the structure of a dense metal in the form of oxide films on the initial powder particles.

The network of oxide films permeating the structure of dense sintered or hot pressed billets reduces their ductility and strength. The studying of this point is one of the tasks of the present investigation.

The present paper describes the investigations carried out on a metal obtained by hot pressing uranium powder.

Essentially non-porous billets are produced by hot pressing in stainless steel dies.

The high stability of the metal to cyclic changes of temperature results from the fine-grained quasi-isotropic structure of the hot-pressed metal.

The variation in the conditions of the thermomechanical treatment of hot pressed billets results in a change of their structure, eliminates embrittling effect of oxide film inclusions and permits to vary the properties of a dense metal in a wide range.

The tables and figures available show the effect of the amount of the flux ($CaCl_2$) in the charge (UO_2 + Ca) on the uranium powder particle size distribution as well as the powder particle shapes, the metal structure, the

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character of the oxide inclusion distribution and the properties of uranium prepared by the powder metallurgy technique as a function of the thermo-mechanical treatment conditions.